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Evaluation of Some Horticulture Crop Varieties For Their Suitability To The Food Processing Industry

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Introduction

Proper variety selection requires an understanding of what traits are useful to the grower and preferred by the market. Processors are interested in traits that relates to better color, size, eating quality (sweetness, texture, and aroma) and conversion ratio or yield efficiency. On the other hand, traits such as vigor, pest, disease and stress resistance and high marketable yield are important to most growers, but generally of little concern to the processor. A good variety should fulfill the needs of both growers and processors.

Toward this end, trials were conducted to evaluate 25 varieties from 8 crops though two crop cycles. The purpose of these trials was to identify potential varieties from every crop, which would offer the food processor a better alternative than what is currently available from the wholesale market targeted. Improvements are better quality, better conversion efficiency, and better field yield. This study focused mainly on artichokes, broccoli, cauliflower, green beans, processing peas, dehydration onions, sweet corn and processing tomatoes.

Close collaboration with seed companies led to the identification of several varieties to test for each crop. Seminis (the largest developer, grower and marketer of fruit and vegetable seeds in the world.), Harris Moran (part of the largest independently-owned seed company in the world) and Corona Seeds (a California-based seed distributor company) were three of companies that contributed seeds and technical assistance. Testing was done in collaboration with the Horticulture Research Institute (HRI) the HRI was of great assistance to the program. Sharing the findings of the trial data was useful to both ALEB and the HRI.

Trials were planted in two locations in Egypt; a private farm in Sharkia and the experimental station of the Agriculture Materials Company (AMC). The farm in Sharkia currently grows crops under contract with food processors and its owner has been more than generous with his time, technical assistance and land for test plots. AMC is a local agent for Asgrow Seed Company (A subsidiary of Seminis).

This report discusses the results of these trials and is organized by crop. Recommendations on which variety to be used by the processor is outlined at the last section of every crop, and is accompanied by its rational.

Theses trials and subsequent recommendations are based on the prevailing environment during the trial period. Processors or growers wishing to have more information should contact the seed company representative directly for any additional information.

ARTICHOKES

Background:

Artichokes in Egypt are, for the most part, grown as a perennial crop and are propagated by division of the crown. Rooted sections of crowns, called "stumps", selected from commercial fields, are planted by hand in rows with a specified distance between them. The advantage of this procedure, being vegetative propagation, is that the plants are "true to type" with no variations in the shape of the artichoke. Therefore uniformity is achieved using this method of propagation. However the major drawback of this propagation technique is the low survival rate of the transplanted "stumps", generally only 50 to 60%.

An alternative is to grow the artichoke plants from seeds. The seeds begin in the greenhouse nursery in trays. Healthy and vigorous plants are later transplanted in the field at a specified distance. The technique itself has very high success rate in terms of stand establishment. Over 90% of the transplants survive this operation given the proper procedure. One major drawback for this technique has been that artichokes propagated from seeds are not true to type and not uniform. Therefore use of this technique in the industry has been limited. During the past decade efforts to produce artichoke varieties that can be propagated by seeds and posses a high degree of uniformity met with success. Two commercially available varieties, Emerald and Imperial Star, were tested and proved successful. Now, direct seeding is the most popular method of stand establishment in the Southern California desert. Although currently registered in Egypt "Imperial Star" is underutilized because of mixed or insufficient data.

Objective:

To determine if the newly released artichoke hybrids (Emerald and Imperial Star) are suitable for growing in Egypt and can provide uniform artichoke, and be acceptable to the food processors.

Procedure:

Seed samples from varieties "Emerald" and "Imperial Star" were obtained from Corona Seeds, California. Seeds were planted in two locations; one at a private farm in Sharkia and the other was grown at the HRI in Giza. Seeds were planted in plug trays during the month of June and transplanted in the field during August. Both varieties were planted next to each other next to two of the local varieties (Baladi and Faransawy) for comparison purposes. However the local types were planted from crowns and not seeds, since this is the common way of growing these varieties.

Results

Seed germination was good (approx. 80%) for both experimental varieties. This figure represents good germination for the artichoke seeds in general. It was evident after two months from transplanting that the uniformity of the plants was high and the establishment success rate was good for both varieties.

The artichokes were different in shape, (fig 1.1): The new hybrids are larger in size but they have a flatter bottom (i.e. bottoms are not as concave as the local varieties (fig 1.2)).

Hybrid seeds matured later than the local varieties, January vs. December Yields for the hybrids were higher than local varieties. Average number of chokes per plant for the hybrids exceeded 35, compared to 18 for local types. Stand establishment was much higher for the seeded varieties, more than 90% of the transplanted varieties were successful; this is in comparison to a 50% establishment for varieties grown from crowns.

Comments

Generally processors that make artichoke "bottoms" would prefer to have an artichoke that has a deep concave bottom. One disadvantage of the hybrid-seeded varieties a flatter bottom compared to the local varieties (fig. 1.2). However, Emerald had a more concave bottom compared to Imperial Star.

Another concern by the processor is that the conversion ratio for the imported varieties were low. Processors buy the artichokes by count and sell them ,after cleaning, by weight. The count to weight ratio was low for the seeded varieties compared to the regular varieties (fig 1.3). If harvested at the same diameter/size, seeded varieties would yield around 30 bottoms per kg compared to 22 bottoms per kg for the local varieties. This concern is partially valid. To reach the same conversion ratios attained by the local varieties, seeded varieties MUST be picked at a greater size than the local types to achieve the desired weight conversion. The seeded varieties can attain larger size without being overmature and fibrous, unlike the local varieties. Therefore more education is needed to the grower on the proper time of picking the seeded varieties as their maturity indices is different from the local types. We noticed this problem only this year.

Processors using the artichokes to make "baby artichoke" should not have any such concerns because the artichokes are small in diameter and none of the above characteristics would affect the chokes when they are at that small size.

Conclusion:
Emerald and Imperial Star produced higher yields than the local varieties per unit area, more than double. The artichokes were uniform to a high degree. These varieties need to be picked when it reaches diameters between 14 to 17 cm to achieve the same conversion ratios as that of local types.

Emerald offers a better alternative to Imperial star because of its more concave bottom (fig 1.2), a characteristic required by export customers.

For processors of baby artichokes, both varieties are suitable and offer higher field yields, which directly reduces the cost of raw material.

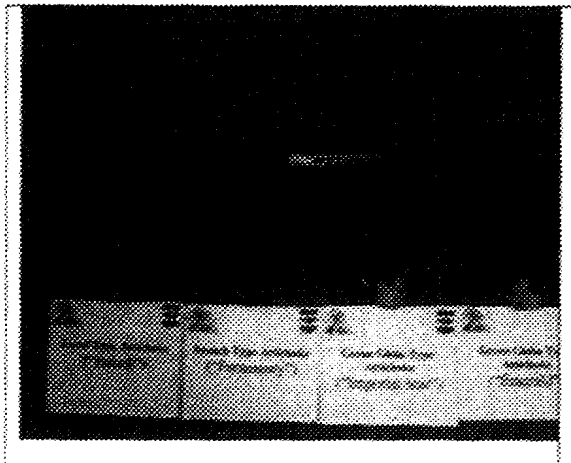


Fig 1.1: **From left to right, Baladi, Faransawy, Imperial Star and Emerald**

Fig 1.2: **Longitudinal section showing the shape of the artichoke bottom in the 4 varieties**

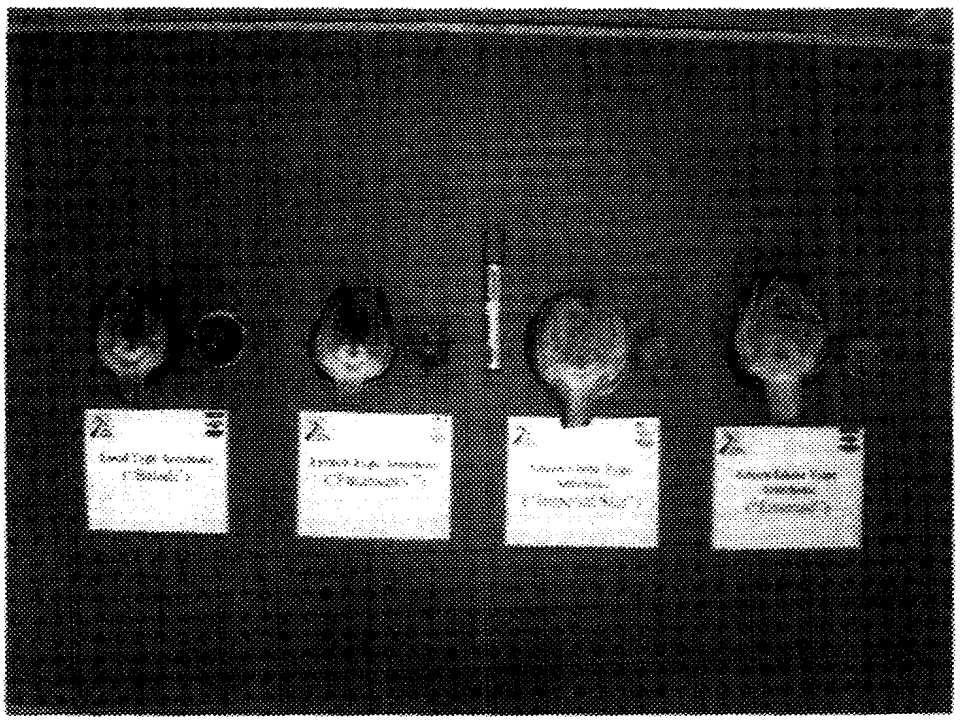


Fig 1.3: Conversion ratio expressed in the size of the bottom (right) compared to the size of the choke (left)

BEANS, GREEN

A major cost in the production of green beans in Egypt is the labor for harvesting. In Egypt, green beans are harvested by hand. One deterrent to growing green beans whether for the processing industry or the fresh market, is the amount and cost of labor involved in this operation. One processor cannot depend on large farms because of the uncertain logistics of having such a large labor force available at just the right time. Therefore the processors tend to buy the beans from middlemen that collect the beans from several small growers and then deliver them to the processor . The above procedure laves no control over the raw material going into the processing facility.

One way to reduce the cost of harvesting is to use green bean varieties that are specially bred for mechanical harvesting. Varieties that are bred for that purpose posses a "concentrated set", that is the all pods on the plant mature at almost the same time. In this case the crop can be harvested mechanically all at once,thereby reducing the labor costs and increasing the cultivated area. Theses varieties should also possess all the quality characters the processor is looking for in a green bean, like fresh green color, medium sieve size, straight pods and stringless (i.e. the absence of the tough fiber that runs alongside the bean pod in some varieties).

One of the most common bean varieties grown in Egypt to serve the processing market is a variety called "Bronco" from Asgrow Seed Company. The variety posses good pod quality in terms of color, sieve size, straightness and texture. However this variety is bred for hand harvesting, and therefore requires a lot of labor to harvest an economical crop.

Objective

To identify varieties of green beans that have the characteristics of the concentrated set and possesses the same or better quality characteristics as that of the common variety "Bronco".

Procedure

Seminis and Harris Moran Seed companies provided twelve varieties for evaluation (table 2.1).

Table 2.1: Twelve green bean varities used in ALEB evaluation trials.

No.	Variety Name	Seed Source	No.	Variety Name	Seed Source
1	Bronco	Asgrow	7	Goldmine	Asgrow
3	Carlo	Asgrow	9	Goldrush	Asgrow
5	Dart	Harris Moran	11	Matador	Asgrow
4	Envy	Harris Moran	10	Nicelo	Asgrow
2	Festina	Asgrow	8	Savannah	Harris Moran
6	Flavio	Asgrow	12	Warrior	Asgrow

All twelve varieties were planted on the 12th of October 2004. The trials were planted at the experimental station of the AMC, the local dealer for Asgrow. AMC agreed to

host the trials on its ground and provide technical assistance and personnel to take the necessary data following ALEB recommendations.

The green bean varieties were cultivated using a drip irrigation method and plastic mulch over the rows. The plastic mulch offers good way to conserve moisture and reduce the weed population that may affect the green bean plants. Good vigor and low disease pressure were observed during the trials.

Results:

The table below, (table 2.2), shows the data taken on the twelve varieties. The traits in the table represent those that would be of interest to the food processor.

Table 2.2:

Variety	Color	Yield Concentration*	Yield per acre (tons/acre)	Pod Diameter (cm)	Recommendation for further testing by processors (Yes/No)
ENVY	Medium Green	78%	4.20	1.00	Y
BRONCO	Medium Green	74%	2.90	1.00	Y
GOLD RUSH	Yellow	81%	3.40	0.70	Y
FESTINA	Light Green	80%	3.80	0.70	Y
NICELO	Light Green	76%	2.00	0.70	N
WARRIOR	Medium Green	73%	3.20	0.70	N
MATADOR	Medium Green	66%	3.40	0.70	N
SAVANNA	Medium Green	62%	4.50	0.70	N
DART	Medium Green	87%	3.30	0.60	N
GOLD MINE	Yellow	84%	3.70	0.50	N
CARLO	Light Green	82%	2.80	0.50	N
FLAVIO	Medium Green	31%	3.80	0.40	N

* Percent of total yield harvested during the first picking.

Green bean variety Envy from Harris Moran Seed Company seems to offer a better alternative to the currently used Bronco variety from Seminis. Envy offers the processor same quality traits as that of Bronco, however its field yield is higher and more concentrated. As mentioned before, concentrated set gives the opportunity to harvest once or, at most, twice, this reduces the labor cost and permiting the use of harvesting machines if applicable. Festina and Nicelo from Seminis offer good concentrated set, however the pod diameter is below the requested diameters by the processors.

Conclusion:

Three varieties (Envy, Festina and Nicelo) are varieties that have potential to reduce the harvesting costs through the reduction in the number of picking required to harvest the crop. Conclusive results will appear when these varieties on a larger scale than test plots.

Photos of the varieties are shown in the next page.

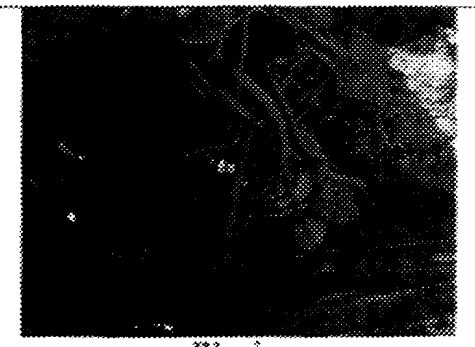
Envy

Bronco

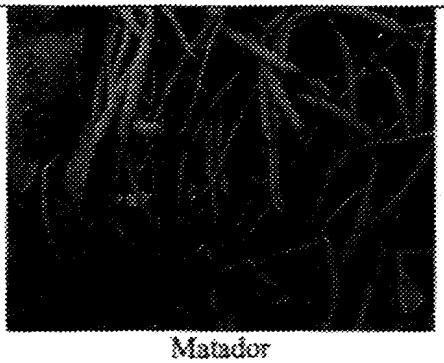
Gold Rush

Festina

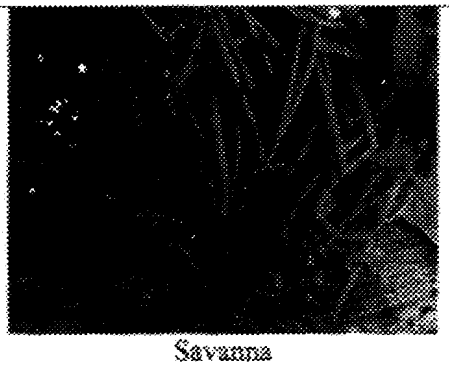
Nicelo



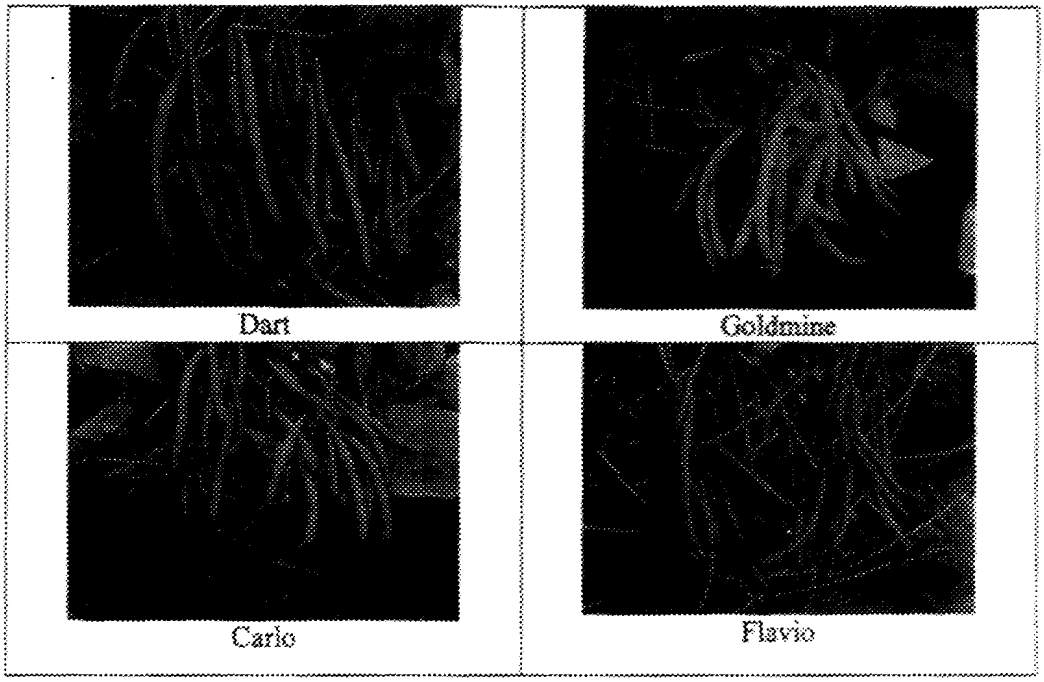
Warrior



Matador



Savanna


Dart
Goldmine
Carlo
Flavio

BROCCOLI

Broccoli is still a new crop to the Egyptian market. In recent years the crop has gained popularity among consumers for it health benefits. Because of the limited use of the crop in Egypt, varieties available commercially are likewise limited. Processors started demanding the crop to satisfy the needs of the market in the off-season. Once available on their product list, export customers started asking for the crop. Processors were ready to supply the product using the locally available varieties from the market. To their surprise, the varieties were different in their response to the blanching and freezing.

As with other crops, there are special varieties of broccoli that is more suitable for processing than currently available fresh market varieties.

Objective

To identify broccoli varieties most suitable for the freezing industry. Note: For this crop there is one variety that stands out, where 75% of the entire processed broccoli in the US is grown using this variety. The variety is called "Marathon" from Sakata Seed Company. One of the main objectives was to test whether this variety can deliver the same performance under Egyptian conditions and offer food processors the quality they require to compete on the international market.

Procedure

Four broccoli varieties were evaluated for their suitability to the freezing industry (Table 3.1)

Variety	Seed Source
Marathon	Sakata
Premium Crop	Takii
Heritage	Petoseed
Packman	Petoseed

Broccoli varieties were planted in Sharkia. All four varieties were planted next to each other for comparison. Varieties showed good vegetative growth. Seeds were planted in plug trays and after about 40 days they were transplanted to the field during October. Regular agronomic practices were performed on the varieties.

Results

Broccoli variety Marathon proved to be very successful in growing under Egyptian climatic conditions. Marathon possessed the highest head weight and head compactness among varieties tested (Fig 3.2).

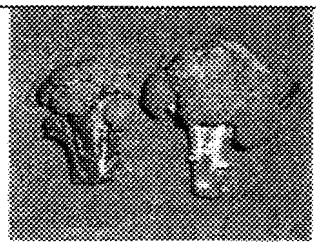


Fig 3.2

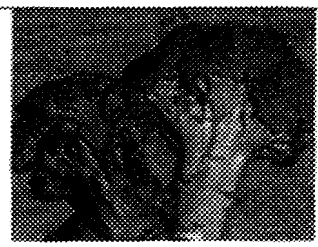


Fig 3.3

Field yield and conversion ratio of the variety Marathon was among the highest in the trials. Heritage and Packman from Petoseed company had good potential as a second alternative to Marathon. (table 3.4).

The following table (3.4) summarizes the yield of the 4 tested varieties.

Variety	Head Diameter	Head Weight	Conversion Ratio	Yield (t/acre)
Marathon	20	450	74%	7.20
Heritage	19	430	72%	6.88
Packman	19	420	72%	6.72
Premium Crop	16	200	65%	3.20

Conversion ratio for broccoli and cauliflower is the ratio between the weight of broccoli florets obtained from one head of broccoli, to the total weight of the head. Only the Broccoli florets are used by the processing industry.

Comments.

Marathon, Heritage and Packman performed well in our trials. However Premium crop was not recommended. Premium Crop did not provide compact heads and had low conversion ratios. Non-compact heads cause the florets to disperse in the blanching water, which further reduces the conversion ratio and creates floating florets that are considered a quality issue.

Conclusion

Broccoli varieties Marathon is very well suited under our condition and very accepted by the processor. Processors are advised to use this variety. A second alternative is to use Heritage or Packman.

CAULIFLOWER

Cauliflower is a common crop in Egypt. Cauliflower is a seasonal crop that is available during the winter and spring seasons. In an attempt to provide the product year round food processors started freezing the crop. Now quality is an issue, very white and compact florets are essential for this product to be exported.

Current varieties available on the market are open pollinated and lack the uniformity, whiteness and compactness of the heads (curds). With the quality demands on this product on the rise, the choice of better cauliflower varieties to use is essential to the success of exporting the demanded quality.

Objective

To allocate and test cauliflower varieties that do well under Egyptian climatic conditions and offer the quality traits processors need.

Procedure

Four cauliflower varieties were tested: Table 4.1.

Variety	Seed Source
Minuteman	Petoseed
Serrano	Sluis & Groot
Siria	Clause
Snow crown	Takii

Samples were grown at a private farm in Sharkia. Seeds were planted in plug trays in October and transplanted in the field forty days later. The four varieties were planted next to each other for close monitoring of differences. Regular agronomic practices were applied to the crop.

Results

All four varieties had better quality traits than the locally grown variety. However, the experimental varieties differed between them in yields conversion ratios and quality traits.

Table 4.2 discusses the traits of the four varieties tested.

Table 4.2

Variety	Head Diameter (cm)	Head Weight (gm)	Conversion Ratio	Yield (tons/fed)
Minuteman	20	720	72%	8.64
Serrano	23	700	74%	8.40
Siria	24	820	72%	9.84
Snow crown	19	200	63%	2.40

Varieties Siria, Serrano and Minuteman had good field yields and conversion ratios. Snow Crown, did not yield as good as the other three varieties and head size was smaller and hence conversion ratios.

The key issue for color was when to harvest the crop. Best color can be obtained when the heads are still completely wrapped by leaves that shelter it from the sun. It is at this time the grower should harvest the heads.

More education to the grower on the best time to harvest the crop, and at the same time process must pay premiums for growers willing to sacrifice weight for quality.

Conclusions

Cauliflower varieties, Siria, Serrano and Minuteman are suitable varieties for processing and processors should be able to improve quality and conversion ratios when using these varieties.

ONIONS, DEHYDRATION

A major contributor to the constraints that face Egyptian dehydrators is the low conversion ratios currently attained. Currently available varieties can convert between 9 to 12 tons to only 1 metric Ton of dehydrated onions. This ratio is very high when compared to those produced in other countries as the U.S. or China, where the ratio is between 4 to 6 ton per one metric ton of dehydrated onions.

The major reason for high conversion ratios is the use of onion varieties that are bred for high total solids. Most of companies in the U.S. have their own breeding program and their high solids varieties are propriety to them. For that reason, varieties for high solid onions is scarce among commercial seed producers. However, some seed companies are just now starting to develop their own line of high solid onions for commercial application for their clients.

Objective:

To test dehydrator onion varieties for their suitability for growing under Egyptian environmental conditions.

Procedure:

Three varieties were identified to have potential to offer the onion dehydrators better conversion ratios. These varieties are shown in the below table:

Table 5.1

Variety	Seed Source
Salamony	Petoseed
Corona White Creole	Corona Seeds
Hybrid 003-532	Corona Seeds

Varieties were grown in the first season at two private farms. The three varieties were seeded in November and harvested in May. The three varieties in addition to Giza 6 and Giza 20 (two local onion varieties) were seeded next to each other and under the same conditions.

Results:

Results during the first year were promising. Salamony variety yielded onions with high percentage of soluble solids (18%). The conversion ratio was 6.5:1, that is, it takes only 6.5 tones of fresh onions to produce 1 ton of dehydrated onion. Currently, dehydrators are getting conversion ratios of 9:1 and sometimes higher when using the local varieties.

The field yields of the variety Salamony cannot be determined because the crop was planted late, and because the planting distance was too close.

Savings from using the onion variety Salamony could mount to millions of pounds. Savings can be calculated based on a reduction in the amount of raw onions needed to produce a certain amount of dehydrated product, or from the increased yield of dehydrated product from the same amount of raw onions purchased.

The other two varieties did not perform well in the first season. The bulbs were too small. This year a second trial with these onion varieties to determine their field yields.

Conclusion

Dehydrator onion variety Salamony from Petoseed can give high conversion ratios for the dehydrators. More testing of this variety in multiple locations is needed to determine the best practices to increase its field yield in multiple geographical locations.

SWEET CORN

Sweet corn is another crop new to the Egyptian market. Its consumption is currently limited to fast food chains and some upscale markets. Sweet corn in Egypt is consumed either canned or frozen, as corn on the cob. All of the canned sweet corn in Egypt is imported.

Seeds are not available commercially on the local market, because of the very low demand. Information about available sweet corn varieties and their suitability to our growing conditions is almost non-existent. Demands from some canners about the potential of processing the crop in Egypt have been on the rise. Canners are also interested in processing the crop, because of the relatively high consumption of this product both on the local and international market.

Demands from processors for this crop necessitates obtaining more information on the varieties of sweet corn available, and their potential to be grown under our environmental conditions.

Egypt has excellent weather conditions to grow this crop over a longer season. With this potential it was necessary to gather more information on available seed sources.

Objective

To identify and test sweet corn varieties that can satisfy the demands of food processors and are adapted to growing under Egyptian environmental conditions.

Procedure

Asgrow Seed Company and Harris Moran offered their assistance in providing the project with twenty varieties (table 6.1) of sweet corn, to test their performance and acceptability to the processors under the Egyptian conditions. The varieties were grown in two locations: one at a private farm in Sharkia and the other was on the AMC experimental station. The super sweet varieties were panted earlier than the sweet varieties to prevent cross contamination between them. Data were collected in both locations.

Plots were harvested when the kernels were near the golden yellow color. Judgments on when to harvest were made based on previous experience and not on moisture testing. Records taken on plant characteristics included plant height ear diameter ear length and yield.

Table 6.1: List of sweet corn varieties used in trials

Entry #	Variety Name	Type	Kernel Color	Company
1	Bandit	Super sweet	Yellow	Harris Moran
2	Basin	Super sweet	Yellow	Asgrow
3	Challenger	Super sweet	Yellow	Asgrow
4	Chase	Sweet	Yellow	Asgrow
5	Cinch	Sweet	Yellow	Asgrow
6	Dynamo	Super sweet	Yellow	Harris Moran
7	Endeavor	Super sweet	Yellow	Asgrow
8	EX 8462518	Super sweet	Yellow	Asgrow
9	EX 0716636	Super sweet	Yellow	Asgrow
10	EX 8452067	Sweet	Yellow	Asgrow
11	Legacy	Super sweet	Yellow	Harris Moran
12	Lumina	Super sweet	Yellov	Harris Moran
13	Madonna	Super sweet	Bicolor	Asgrow
14	Max	Supersweet	Yellow	Harris Moran
15	Rustler	Supersweet	Yellow	Harris Moran
16	Shaker	Super sweet	Yellow	Asgrow
17	Sheba	Super sweet	Yellow	Asgrow
18	Shimmer	Super sweet	Yellow	Asgrow
19	Suregold	Supersweet	Yellow	Harris Moran
20	XP 08715364	Sweet	Yellow	Asgrow

Results

Several sweet corn varieties showed potential to perform well for both the growers and the processors. The freezing industry wants large diameter cobs, straight rows and yellow color. Varieties like Shimmer, Sheba from Seminis and varieties Max, Suregold, Dynamo and Legacy from Harris Moran. All these varieties performed well in all locations.

For canning purposes varieties Basin, EX0716636, and Shimmer offer high kernel recovery. This is mainly due to the long ear length of these varieties, which offer high kernel recovery. Canners are not as interested in cob diameter as freezers. Variety Basin offers ears that can reach 24 cm, but the cob diameter is small. That variety could well be recommended to canners in Egypt.

Variety Bandit from Harris Moran is not suitable for growing in Egypt because of its extreme susceptibility to Stewart Wilt disease. It was the only variety to exhibit the symptoms in both locations. We recommend that this variety not be introduced in Egypt.

Below is a summary of the data taken on the sweet corn varieties (table 6.2).

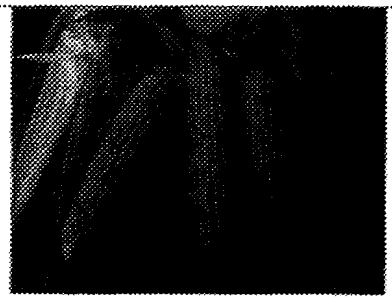
Table 6.2:

Serial	Variety	Days to Harvest	Plant Height	Unhusked Ear Weight (gm)	Husked Ear Weight (gm)	Ear Length (cm)	Ear Diameter (mm)
1	Bandit	X	X	X	X	X	X
2	Basin	74	215	353	187	24	44
3	Challenger	72	182	320	205	21	48
4	Chase	85	159	366	274	18	50
5	Cinch	84	158	285	213	15	48
6	Dynamo	82	158	339	263	18	50
7	Endeavor	70	174	350	213	21	48
8	EX0716636	70	195	370	222	22	49
9	EX8462518	74	229	335	221	19	48
10	Legacy	82	196	396	260	20	49
11	Lumina	82	159	377	258	19	49
12	Madonna	84	159	397	274	19	51
14	Max	62	164	362	217	18	49
15	Rustler	77	154	267	176	18	45
16	Shaker	73	159	387	199	22	45
17	Sheba	69	207	324	201	22	49
18	Shimmer	73	215	345	229	21	49
19	Suregold	77	175	320	204	19	48
20	XP 08715864	X	X	X	X	X	X

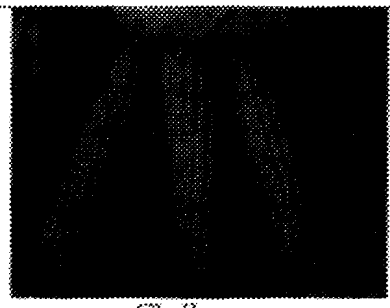
Summary

Varieties like Basin, Endeavor, Max, Shimmer, Sheba, and Suregold can perform well under Egyptian environmental conditions. ALEB would strongly advise processors to use any of the above-mentioned varieties for their raw material. Canners are advised to use the sweet corn Basin from Asgrow for high kernel recovery.

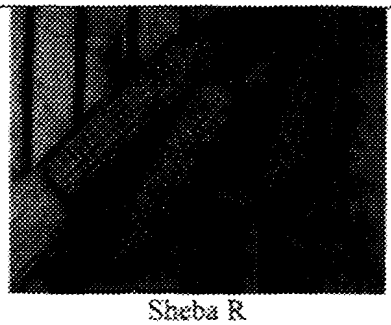
Below are some photos of varieties of sweet corn tested at AMC experimental station



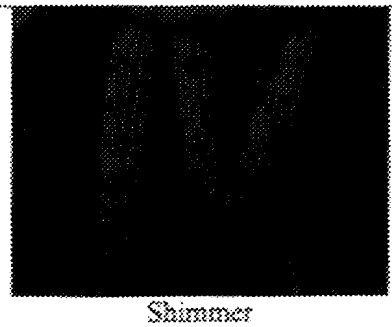
Basin



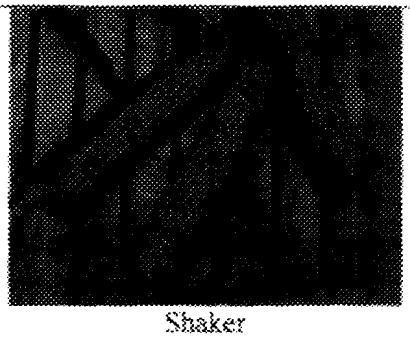
Challenger



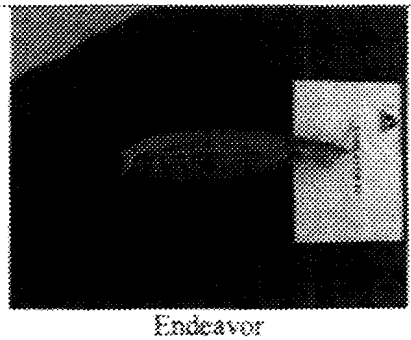
Sheba R



Shimmer



Shaker



Endeavor

Mr. Dennis Magee, overseeing sweet corn trials at AMC

PROCESSING TOMATOES

Processing tomato varieties possess some characteristics that are not met by fresh market varieties. Tomato processors are looking for characteristics such as high Brix, medium to high viscosity, and deep red color. Processing varieties are bred to possess these characteristics as well as a concentrated set.

Tomato varieties that are specifically intended for the processing market is almost non-existent in Egypt, with the exception of Heinz. Tomato processors used to import tomato paste for remanufacturing because of the unavailability of local raw material at an economical price. With the devaluation of the local currency, importing has become less attractive. Processors turned to the local market for their raw material supply. Since the local market for tomatoes has always been driven by fresh market demands, no processing tomatoes were introduced and therefore never grown. Processing tomato varieties are not acceptable by the local fresh market because of their generally small size (70-100 gm). With the increasing demand for the processing tomatoes, data is needed to identify processing tomato varieties that are suitable for both the processor and the grower.

Objective:

To identify proper tomato varieties suitable for both the processors and the growers needs.

Procedures

Trials the previous year comprised of only two varieties from Seminis grown at a private farm in Sharkia. More varieties were needed. Seminis and Campbell Seeds supplied samples of fifteen processing tomato varieties for our trials.

All fifteen varieties (table 7.1) are currently grown in Sharkia .

No.	Variety	Seed Source	No.	Variety	Seed Source
1	HyPeel 513	Petoseed	9	CXD 206	Campbells
2	HyPeel 347	Petoseed	10	CXD 208	Campbells
3	Hypeel 303	Petoseed	11	CXD 216	Campbells
4	Hypeel 696	Petoseed	12	CXD 219	Campbells
5	Brigadier	Asgrow	13	CXD 222	Campbells
6	CXD 142	Campbells	14	CXD 223	Campbells
7	CXD 179	Campbells	15	CXD 224	Campbells
8	CXD 199	Campbells			

Results

Preliminary results for last year's two varieties showed that varieties Hypeel 347 and Hypeel 514 performed better than regular fresh market tomatoes. The processor who utilized these varieties noticed saving of about 10%. The processor was looking for even better conversion ratios. For this reason we decided to plant more varieties and deliver them to a wider number of processors for feedback and evaluation.

Data from on-going test plots are still inconclusive. More conclusive data will be available this year.

PEAS, PROCESSING

Processing peas in Egypt faces the same constraints as that of green beans, which is the high labor cost in the harvesting operation. In the case of peas, the problem is even worse, because the peas need not only to be picked but they also need to be hand shelled.

Large farms showed interest in the possibility of growing, harvesting and shelling the peas mechanically. Although this operation will definitely save on labor and shelling costs, varieties planted for that purpose in not existent in the local market. Varieties suitable for this type of harvest need to posses some characteristics that are lacking for the local fresh market varieties. The two major traits that must be available in these varieties are; concentrated harvest and pods that are placed at a higher distance from the ground.

Concentrated harvest is a trait that gives the grower the possibility of harvesting the crop all at once, even though he may be sacrificing 10 to 15% of the crop in return for labor savings. The second trait, which is high flowering node, is important because pods need to be high off the ground so that the harvester head would not have to go close to the ground to harvest the pea pods. Operating the harvester head so close to the ground level can cause mechanical damage.

Objective:

To find a variety suitable for machine harvest that possesses quality traits required by the processors.

Procedures

Ten processing pea varieties (table 8.1) were supplied by Asgrow Seed Company for evaluation under Egyptian environmental conditions.

No.	Variety	Seed Source
1	Darien	Asgrow
2	Quantum	Asgrow
3	Durango	Asgrow
4	Eclipse	Asgrow
5	Prism	Asgrow
6	Twin	Asgrow
7	Trompet	Asgrow
8	Survivor	Asgrow
9	Perfection	Asgrow
10	Bolero	Asgrow

The ten varieties were grown at two locations, at Sharkia and at the AMC experimental station. The peas were grown using the regular growing techniques for peas in Egypt. The varieties were planted next to each other for close evaluation. Planting started during the second week of October. Plants were well established in

the ground. Germination was very good for all varieties, compared to the locally grown variety (fig 8.2 & fig 8.3).

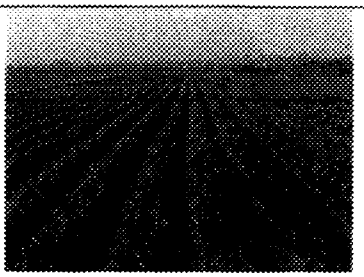


Fig 8.2
Low germination of local variety

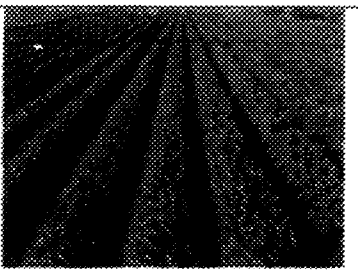


Fig 8.3
High germination of one of the new peas varieties

Results

Results indicate that the imported varieties are more suitable for sowing during late December or early January. Our first trial was seeded during the first week of October. Because of the cool season plants were very late to mature. The plants were very bush and vegetative, and pods developed at 85 days from seeding. This is late compared to 65 days for the local variety. Plant height reached 1.20 meters in some varieties which can cause problems managing the crop

Plants that were seeded during late December had the chance to grow in warmer temperatures and therefore their growing behavior was different. These plants were very fast to grow and flowered earlier. The plants did not attain the same heights as those from the earlier planting date, around 80 cm, a height that can easily be managed.

One major advantage of these varieties over the local variety was the concentrated set. These varieties have a tendency to have around 80% flowering at the same time. This is a major advantage over the local variety which is around 65%. This trait enables growers to grow this crop at 20% more density and harvest the crop once.

It was clear that the second planting had a larger number of flowers and than in the first planting. In both plantings all varieties yielded higher number of pods than the local variety.

Pods for the processing varieties were generally smaller in size than the local fresh market variety. However the number of pods per plant was clearly higher for the processing types.

Sugar content for all varieties were almost the same and there no distinction in the taste for any of the varieties, including the local type.

Table 8.4: Yield data for processing pea varieties.

Variety	Yield (t/acre)
Trompet	5.3
Survivor	4.9
Bolero	4.3
Survivor	3.9
Perfection	3.9
Durango	3.6
Prism	2.8
Darien	2.8
Perfection	2.6
Eclipse	2.1
Twin	1.3

Conclusions

1. Processing varieties, Trompet, Survivor, Bolero, Survivor, Perfection and Durango have the potential to do well for mechanical harvesting and provide good field yields (table 8.4).
2. Processing varieties should be planted during December or early January for better yields.
3. Processing varieties can save on harvesting costs, by harvesting only once and increasing the plant density to adjust for the second harvest losses.
4. These varieties flower at higher nodes on the plant, making them suitable for mechanical harvesting.
5. Conversion ratios are the same as those for local varieties (40-43%)
6. No change in the taste of the varieties was noticed.

Annex A: Contact information on international seed suppliers and their local representatives.

International Office	Local Representative
ASGROW Seminis Vegetable Seeds 2700 Camino Del Sol,Oxnard, CA 93030 Tel: 805 647 1572 Fax :805 918 2548 www.seminis.com	**AMC** Mr. Wagih Metwaly 426 Alharam Street Giza, Egypt Tel:02 776 2257, 02 776 2258 Fax: 027762229 Email:agrimatco@link.com.eg
CORONA SEEDS 590-F Constitution Avenue Camarillo, California 93012 USA Tel: 805 388 2555 Fax: 805 445 8344 Email:coronaseed@aol.com www.coronaseeds.com	
HARRIS MORAN SEED COMPANY 555 Codoni Avenue Modesto, CA Phone: 209 579 7333 Fax: 209 521 1524 www.harrismoran.com	**SAMTRADE** 50 Street105 Maadi Cairo, Egypt Tel:02 525 3725 – 02 525 3747 Fax: 02 525 3728
NUNHEMS ZADEN BV P.O.Box 831098 Amman – 11183 Jordan Tel:962 6 5155579 Fax:962 6 5155580 Email:s_refai@go.com.jo www.nunhems.com	**AGRIMATCO** Mr. Wagih Metwaly 426 Alharam Street Giza, Egypt Tel:02 776 2257, 02 776 2258 Fax: 027762229 Email:agrimatco@link.com.eg
PETOSEED Seminis Vegetable Seeds 2700 Camino Del Sol,Oxnard, CA 93030 Tel:805 647 1572 Fax:805 918 2548 www.seminis.com	**SAMTRADE** 50 Street105 Maadi Cairo, Egypt Tel:02 525 3725 – 02 525 3747 Fax: 02 525 3728
SAKATA SEED CORPORATION Yokohama Head Office 2-7-1 Nakamachidai,Tsuzuki-ku Yokohama,224-0041 Japan Tel:045 945 8800 Fax:045 945 8841	**MOHAMMAD FARID GAARA** 74 Ahmad Maher Street Bab El Khalk Cairo, Egypt Tel: 202 402 0152 Fax: 202 512 1151
TAKII & CO., LTD 180, Umekoji, Inokuma	**SEIF-ALLAH GAARA** 17 Ahmad Maher Street

Shimokyo-ku Kyoto, (600-91), Japan P.O.Box 7, C.P.O., Kyoto Japan Tel:075 365 0123 Fax:075 365 0110	Bab El Khalk Cairo, Egypt Tel: 202 512 6868 Fax: 202 511 6103